REMARKS

In the Final Office Action, claims 1-11, 14-31, 34-41, and 43-48 were rejected.

By this Reply and Amendment, claims 9-14 have been amended; claim 8 has been canceled without prejudice; and claims 1-7, 9-24 and 26 remain pending in the present application. All claim amendments are fully supported throughout the description and figures of the specification. No new matter has been added.

In the Final Office Action, claims 1-9, 11-14, 16-39, and 42-48 were rejected under 35 U.S.C. §102(b) as being anticipated by C.K. Woodrow (SPE/IADC 67729) article. The rejection is respectfully but strongly traversed.

In the Office Action, claim 1 was rejected by the SPE/IADC article. The SPE/IADC article was interpreted as disclosing a method for analyzing distributed temperature data from a well, comprising: using a distributed temperature sensor system to obtain temperature profile data along a portion of a wellbore; providing the temperature profile data to a processor; automatically determining whether fluids are flowing into or out of a tubing located in the well by processing the temperature profile data; and highlighting valuable information to a user related to the flow of fluid relative to the tubing. (Pg. 2). However, Applicant respectfully maintains that the Examiner has failed to establish a *prima facie* case of §102(b) anticipation by anticipating each and every element of claim 1.

For example, the SPE/IADC article fails to disclose or suggest "automatically determining whether fluids are flowing into or out of a tubing located in the well by processing the temperature profile data." After a thorough search of the SPE/IADC article, Applicant is unable to locate any specific teachings in which the temperature data is processed, much less, processed in order for automatically determining whether fluids are flowing into or out of a tubing. The Response to Arguments section of the Office Action recites that displaying the data on-site teaches the provision of the temperature profile to a processor insofar as because the data is subsequently displayed to the user, this data must be processed. However, this contradicts teachings in the SPE/IADC article which expressly refer to the data as "raw data."

As stated in the SPE/IADC article, the data displayed in each of the two graphs is the raw, un-processed data extracted from the distributed temperature system. (For example, "The graph shows the raw data extracted from the distributed temperature system indicating the initial thermal profile of the wellbore (thicker line) and the various thermal profiles following initial kick-off." SPE/IADC article, pg. 3). Further, there is no automatic determining of the fluid flow into and out of the tubing. In the SPE/IADC article, an engineer is performing a manual analysis of raw data from the distributed temperature sensors. "The temperature data can be displayed on-site, stored for later analysis or transmitted in real-time via modem or scada/modbus links to office based engineers. The data can *then* be interpreted utilizing appropriate software applications." (Emphasis added). (SPE/IADC article, pg. 2, final paragraph, **Principle of Operation**). As such, there is no automatic interpretation of the data. Accordingly, the SPE/IADC article fails to disclose or suggest at least these elements of claim 1.

As another example, the SPE/IADC article fails to disclose or suggest "highlighting valuable information to a user related to the flow of fluid relative to the tubing." The graph shown in Fig. 4 was manually interpreted by an engineer as showing the gaslift valves opening and closing. However, none of this information is highlighted or indicated as such on the graph, for example. As a result, the SPE/IADC article fails to anticipate at least this element of claim 1. Accordingly, due to at least these reasons, the rejection under 35 U.S.C. §102(b) of claim 1 is unsupported and should be withdrawn.

With respect to dependent claims 2-9, 11, 14-21, since these claims depend from and further limit claim 1, these claims should be in condition for allowance for at least the reasons that claim 1 is in condition for allowance. In addition, with respect to dependent claim 2, the SPE/IADC article only displays graphs of raw data (see above) and does not indicate that the raw data shown has been processed via removing noise from the temperature profile, much less, automatically processed via removing noise. Similarly, the SPE/IADC article fails to disclose or suggest any additional steps taken for processing of the raw temperature profile. As such, the SPE/IADC article does not disclose removing low order spatial trends of claim 3, utilizing a high-pass filter of claim 4, utilizing a low-pass filter of claim 5, trend removal and filtering of the temperature profile data of claim 11, or using a match filter of claim 16. In **Future plans**, the

SPE/IADC article suggests that additional thermal modeling study work may be performed using commercially available software such as WellCAT or PLATO, but there is no teaching or suggestion either identifying what procedures to perform or even if the commercially available software is capable of performing the claimed procedures.

Dependent claims 6-9 refer to applying a model-fitting algorithm to the data. However, the SPE/IADC article recites that "we have not yet established a thermal model that can accurately match the observed temperature profile." (SPE/IADC article, pg. 3). In fact, the SPE/IADC article teaches against the use of modeling. ("this technology really can deliver qualitative information to directly improve reservoir and well performance without sophisticated modeling." SPE/IADC article, pg. 3). Therefore, for at least these reasons, a person of skill in the art would not believe that applying a model-fitting algorithm to the data would be successful. Accordingly, dependent claims 6-9 should be in condition for allowance and the rejection regarding these claims is respectfully requested to be withdrawn.

Regarding dependent claims 16 and 17, the SPE/IADC article teaches that engineers interpreted the graph of raw data to identify gaslift valves opening and closing. There is no teaching or disclosure anticipating the use of a match filter (claim 16) to identify a particular downhole event (claim 17). As a result, for at least these reasons, dependent claims 16 and 17 should be in condition for allowance. And since dependent claims 18-20 depend from dependent claim 17, for at least these reasons these claims should also be in condition for allowance.

Turning now to independent claim 22, the SPE/IADC article recites outputting of raw temperature profile data in the form of a graph. The graph is then interpreted through observation to identify downhole events. (For example, "The unusual non-linear features that have been observed in the static 'geothermal' gradient in fig. 4 and 5...," SPE/IADC article, pg. 3). There is no disclosure or suggestion in the SPE/IADC article for a "processor being programmed to identify a particular temperature signal that corresponds to a specific downhole event." As such, there is also no disclosure or suggestion that "the processor outputs valuable information related to the specific downhole event to a user." For at least these reasons, the §102(b) rejection is unsupported for failing to completely anticipate each and every element of

independent claim 22. Applicant accordingly respectfully request that the §102(b) rejection be withdrawn.

Dependent claims 23-30 depend from independent claim 22. Therefore, dependent claims 23-20 should be in a condition for allowance for at least the reasons that independent claim 22 is in a condition for allowance. Accordingly, Applicant respectfully requests the withdrawal of the §102(a) rejection regarding these dependent claims.

The SPE/IADC article fails to disclose or suggest each and every element of independent claim 31. For example, the SPE/IADC article fails to disclose or suggest "automatically processing the data to detect specific events related to heat energy in the well" and "further automatically processing the data to determine a flow rate of fluid in the well," as in claim 31. As described earlier, the graphs shown in fig. 4 and 5 of the SPE/IADC article contain raw data extracted from the distributed temperature system and therefore are not automatically processed. Further, the SPE/IADC article recites that the engineers "had also hoped to infer flowrate from the temperature gradient observed below the bottom gaslift valve." (SPE/IADC article, pg. 3). There is no indication that they were successful in their hope. The next sentence describes their confusion regarding the results "What we actually saw during the gaslift kick-off of TA-27 was surprising" (SPE/IADC article, pg. 3). In addition, their failure at using the system to determine the flow rate of fluid in the well is characterized by their failure to establish a thermal model for the system. ("we have not yet established a thermal model that can accurately match the observed temperature profile." SPE/IADC article, pg. 3). Accordingly, a person of skill in the art would be dissuaded from embodiments of the present invention as claimed within claim 31 after reading the SPE/IADC article. For at least these reasons, Applicant believes that the §102(b) rejection is unsupported and that independent claim 31 is in a condition for allowance. Therefore, Applicant respectfully requests that the §102(b) rejection be withdrawn.

Dependent claims 34-39, 41, 43-48, all depend from independent claim 31 and should be allowable for at least the reasons that claim 31 is considered allowable. Additionally, dependent claims 36-39, and 41 refer to applying a model or model-fitting algorithm to the data generated by the distributed temperature sensor. However, as discussed earlier, the SPE/IADC article expressly teaches away from this possibility by discussing their failure to "establish a thermal

model that can accurately match the observed temperature profile." (SPE/IADC article, pg. 3). Therefore, dependent claims 36-39, and 41 should be allowable for at least this reason as well as the previous reasons. Accordingly, Applicant respectfully requests that the §102(b) rejection for these claims be withdrawn.

The SPE/IADC article teaches that engineers interpreted the graph of raw data to identify gaslift valves opening and closing. There is no teaching or disclosure anticipating automatically processing the data to detect the particular temperature signals corresponding to the location of a gas lift valve (claim 43), or the use of a match filter (claim 47). As a result, for at least these reasons in addition to other reasons previously given, dependent claims 43 and 47 should be in condition for allowance. Applicant respectfully requests that the §102(b) rejection for dependent claims 43 and 47 be withdrawn.

Independent claims 10 and 40 were previously rejected under 35 U.S.C. §103(a) under the SPE/IADC article in view of Riza (U.S. Pat. No. 6,360,037). This rejection is respectfully traversed. The combination of references fails to disclose numerous elements of the subject claims, and therefore, no *prima facie* case of obviousness has been established.

As stated earlier, the SPE/IADC article and the Riza references, taken alone or in combination, fail to disclose, teach, or suggest "automatically processing the temperature profile data to highlight valuable information to the user" wherein the automatic processing comprises "applying a model-fitting algorithm to the data" as recited in independent claim 10. Similarly, the references fail to disclose, teach or suggest "automatically processing the data to detect specific events related to heat energy in the well" wherein the automatic processing comprises "applying a model-fitting algorithm to the data and applying the model-fitting algorithm comprises constructing a match filter and using extrema of a convolution of the filter with data to select candidate depths" as recited in independent claim 40. Accordingly, no *prima facie* case of obviousness has been established, and the rejection should be withdrawn.

Claim 15 was rejected under 35 U.S.C. §103(a) as being unpatentable over the SPE/IADC article. This rejection is respectfully traversed, however claim 15 directly depends from independent claim 1. Accordingly, the rejection of claim 15 under 35 U.S.C. §103(a) is

unsupported for at least the reasons provided above with respect to claim 1. The SPE/IADC article does not establish *prima facie* obviousness, and the §103(a) rejection should be withdrawn.

Claim 41 was rejected under 35 U.S.C. §103(a) as being unpatentable over the SPE/IADC article in view of Tubel (U.S. Pat. No. 6,012,015). This rejection is respectfully traversed, however claim 41 directly depends from independent claim 31. Accordingly, the rejection of claim 41 under 35 U.S.C. §103(a) is unsupported for the reasons provided above with respect to claim 31. Addition of the Tubel reference does not obviate the deficiencies of the SPE/IADC article to establish a *prima facie* case of obviousness, and the rejection should be withdrawn.

In view of the foregoing remarks, the pending claims should be in condition for allowance. However, if the Examiner believes certain amendments are necessary to clarify the present claims or if the Examiner wishes to resolve other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

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